combustion of any substance. This time element varies with the temperature of the combining bodies according to an exponential law. High-velocity combustion may be extremely desirable in artillery practice, or in a very high-speed gas engine, but it would be of doubtful utility in a boiler setting or an industrial furnace. The velocity of the reaction is dependent upon mixing as well as temperature; that is, the same amount of gas burned per unit of time will give a short flame when jetted through numerous small holes and a long flame when burned in one jet.

The facility with which gaseous fuels may be mixed with their air supply is one of their inherent advantages over liquid and solid fuels. The liquid fuels fall into an intermediate class, while liquids which have a low evaporative temperature are intermediate between those of high boiling point and the gases.

The investigations of Mallard and Le Chatelier determined the heat capacity and specific heats of several gases, the heat capacity of any substance being the amount of heat which will be absorbed by or given up by that substance when heating or cooling between the absolute temperatures of *TO* and *TI.* The specific heat of this substance at any given temperature may be derived from its heat capacity, or the amount of heat that will be absorbed in increasing its temperature from *TQ* to *TI.* In all heating and cooling operations, the heat capacities of the substances involved are much more important than their specific heats, as the function of the operation is heat interchange. The heat capacities fix the amount of heat that may be given up by one substance as well as the amount of heat absorbed by the other substance, between the temperature limits involved.

Therefore these curves, in addition to showing approximately the temperature that may be realized from the combustion of the

particular combustible, give the amount of heat that will be available or given off by the products of combustion in cooling from a high temperature to a lower one.

The utilization of this heat will depend upon:

(a) The ruling temperature of the operation, that is, the upper and lower temperatures required;

(6) The design of the heating chamber;

(c) The heat capacity of the substance to which the heat is imparted;